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WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada



U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Collaborating with
CALIFORNIA DEPARTMENT of WATER RESOURCES
and
BRITISH COLUMBIA DEPARTMENT of
LANDS, FORESTS and WATER RESOURCES

AS OF
MAY 1, 1978

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

COVER PHOTO: SOME OF THE DATA IN THIS REPORT HAVE BEEN RECEIVED THROUGH THE SOIL CONSERVATION SERVICE'S NEW SNOTEL SYSTEM WHICH TRANSMITS INFORMATION VIA THE SPACE AGED METEOR BURST METHOD FROM DATA SITES TO MASTER STATIONS LIKE THESE.

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 510, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	Room 129, 2221 East Northern Lights Blvd., Anchorage, Alaska 99504
Arizona	Room 3008, Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1220 S.W. Third Ave., Portland, Oregon 97204
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82602

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P.O. Box 388, Sacramento, California 95802 --- for British Columbia by the Ministry of the Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia V8V 1X5 --- for Yukon Territory by the Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory Y1A 3V1 --- and for Alberta, Saskatchewan, and N.W.T. by the Water Survey of Canada, Inland Waters Branch, 110-12 Avenue S.W., Calgary, Alberta T3C 1A6.



WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

ISSUED

MAY 1, 1978

The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Corps of Engineers, Forest Service, National Park Service, NOAA, National Weather Service, Geological Survey, and other Federal Agencies, Departments of State Government, Irrigation Districts, Power Companies, and others.

The Department of Water Resources coordinates snow surveys in California.

The Water Resources Service, Department of Lands, Forests, and Water Resources directs snow surveys in British Columbia.

This report was prepared by the Water Supply Forecasting Unit, Engineering Division, Soil Conservation Service, from data supplied by Snow Survey Supervisors of the Soil Conservation Service in the States of Alaska, Arizona, Colorado and New Mexico, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.


Data from California was supplied by the Chief, Water Supply Forecast and Snow Survey Unit, Department of Water Resources.

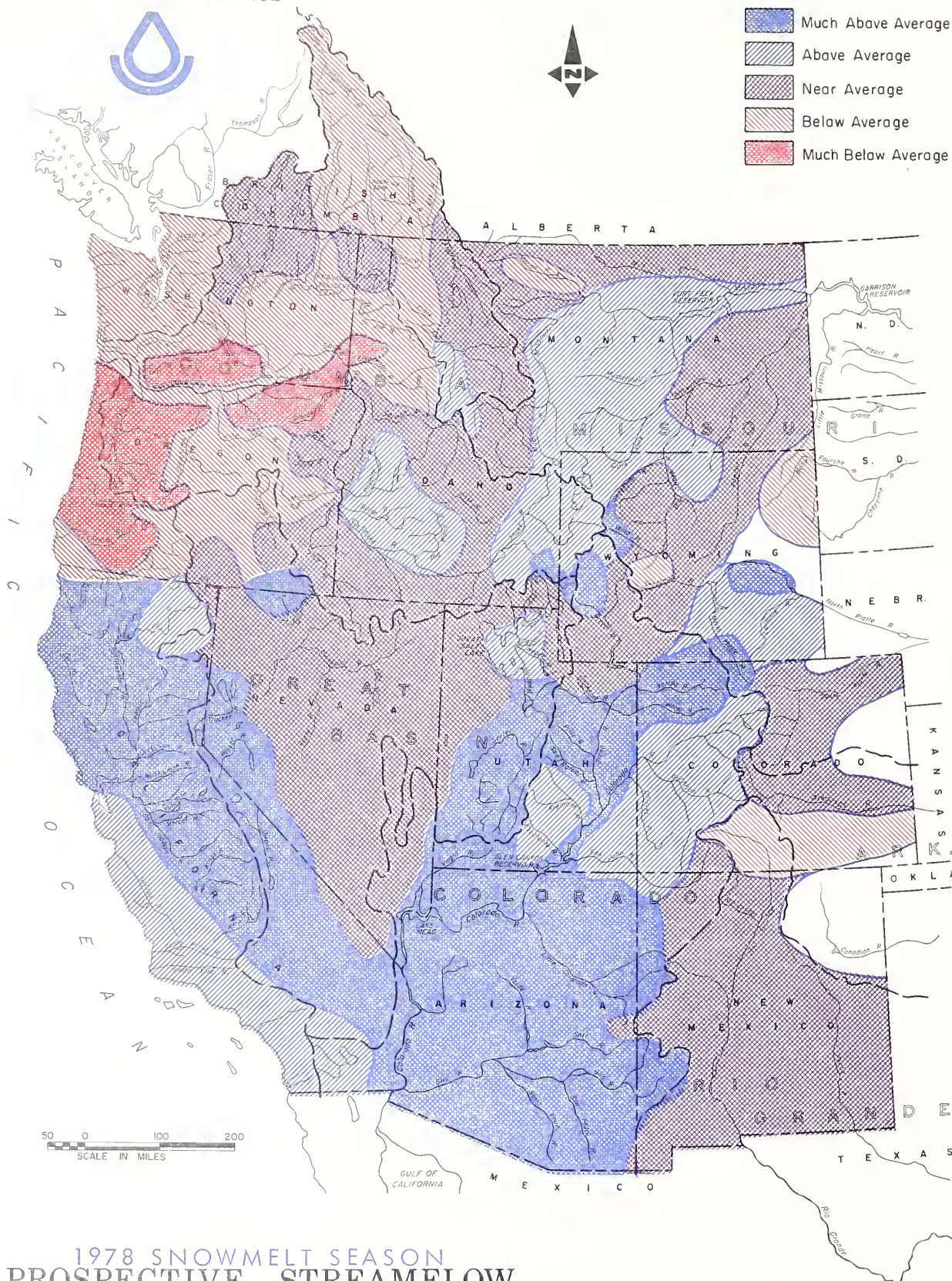
Data from British Columbia was supplied by the Chief, Hydrology Division, Water Investigations Branch, Department of Lands, Forests and Water Resources.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
R. M. DAVIS, ADMINISTRATOR

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



-  Much Above Average
-  Above Average
-  Near Average
-  Below Average
-  Much Below Average



1978 SNOWMELT SEASON
PROSPECTIVE STREAMFLOW
AS OF MAY 1, 1978

WATER SUPPLY OUTLOOK

1978 SNOWMELT SEASON

MAY 1, 1978

WATER SUPPLIES ARE EXPECTED TO BE ABOVE NORMAL OVER MUCH OF THE WEST. HOWEVER, VERY LITTLE SNOW REMAINS IN THE PACIFIC NORTHWEST, AND STREAMFLOW IS FORECAST TO BE BELOW AVERAGE.

A weeklong stormy period began in parts of eastern Colorado and Wyoming just after the May 1 snow surveys were completed. This storm left as much as 5 to 6 inches of water in the form of several feet of new snow on some watersheds. The individual forecasts which appear in this bulletin do not reflect the effects of this major storm.

Most streams in the North and South Platte and Arkansas River basins were forecast to yield near average quantities of snowmelt runoff. The heavy storm is expected to raise some central Wyoming tributaries of the North Platte by as much as 50 percent. Seasonal volumes are now forecast to be well above normal.

Streams heading on the east slopes of the Rocky Mountains in Colorado are expected to yield about 110 percent of average, up about 10 percent over the forecasts before the storm. Reservoir storage in this area remains poor; however, the water supply should be adequate if summer precipitation is near average.

Upper Missouri basin water users can expect normal to above average snowmelt runoff. The snowpack remains near average and reservoirs are generally at or above their normal May 1 levels. Soil moisture levels are about normal, also.

The Columbia basin has the poorest snowpack conditions of any western U. S. region. In British Columbia on the headwaters, the snowpack is 83 percent of normal. Many tributaries heading in the Cascades range and in eastern Oregon and Washington have but 30 to 60 percent of their snowpack remaining. The Columbia is forecast to flow at 89 percent of its 15 year average. Most tributaries to the Upper Columbia will contribute from 85 to 105 percent. The Snake River will yield 120 percent of its normal, with its tributaries ranging from 142 percent from the Greys River to 85 percent from the Malheur.

The snowpack covering most watersheds draining into the Great Basin is heavier than normal. Adequate to excellent supplies are forecast for most water users. Although streams flowing into the basin from the Sierra Nevada will yield much above normal quantities, reservoir storage in Nevada is still poor. The storage supply,

which was depleted during last year's drought, will be replenished to some extent, by the heavy runoff. Reservoir storage in Utah is near normal.

California water users can expect excellent runoff, as a heavy snowpack lingers in the high mountains. Above normal winter runoff has replenished the reservoir storage, which is now slightly above normal.

Colorado river snowmelt runoff will be much above normal. The snowpack is much heavier than average and nearly all streams in the basin will yield above to much above normal amounts. Reservoir storage is normal to excellent. In Arizona reservoir storage was improved greatly by the heavy storms of February and March.

The Rio Grande River is forecast to yield 81 percent of its average at Del Norte, Colorado, but improves to about 95 percent of average at downstream points in New Mexico. Most tributaries will flow at normal to above normal rates. Reservoir storage remains below average, however.

A state by state summary follows:

ALASKA

Mild temperatures and light precipitation were the general rule throughout Alaska during April. An early spring breakup is the result, with snowpacks melting earlier than normal.

All forecasts of snowmelt runoff have been reduced about 5 percent. Ship Creek near Anchorage is now expected to flow 12 percent below normal for the April-July period. The interior is much drier as indicated by a forecast of 40 percent below normal for the Chena River at Fairbanks. Only a few isolated areas of the state will produce above average snowmelt runoff. These are the Kenai Peninsula, the Brooks Range, and a few local areas of the Alaska Range.

ARIZONA

The water supply outlook for the summer is excellent throughout most of the state, and a substantial carryover in reservoirs for next year is expected. Warm temperatures

SUMMARY OF SNOW WATER EQUIVALENT MEASUREMENTS

MAY 1, 1978

MAJOR BASIN AND SUB - WATERSHED	WATER EQUIVALENT IN PERCENT OF :		MAJOR BASIN AND SUB - WATERSHED	WATER EQUIVALENT IN PERCENT OF :	
	LAST YEAR	AVERAGE		LAST YEAR	AVERAGE
MISSOURI BASIN			SNAKE BASIN		
Jefferson	395	103	Snake above Jackson, Wyo.	657	119
Madison	449	104	Snake above Hiese, Idaho	658	112
Gallatin	212	100	Henry's Fork	1,202	116
Missouri Main Stem	234	102	Southern Idaho Tributaries	580	109
Yellowstone	214	101	Big and Little Wood	2,765	126
Shoshone	434	64	Boise	2,704	112
Wind	442	105	Owyhee	-	102
North Platte	218	117	Payette	1,289	102
South Platte	202	99	Malheur	-	45
ARKANSAS BASIN			Weiser	-	78
Arkansas	291	114	Burnt	479	88
Cucharas - Purgatoire	-	6	Powder	5,767	81
RIO GRANDE BASIN			Salmon	2,288	103
Rio Grande (Colo.)	389	91	Grande Ronde	680	94
Rio Grande (New Mexico)	-	-	Clearwater	234	80
Pecos	-	-	LOWER COLUMBIA BASIN		
COLORADO BASIN			Yakima	188	56
Green (Wyo.)	1,614	116	Umatilla	-	52
Yampa - White	806	151	John Day	842	64
Duchesne	-	135	Deschutes - Crooked	209	64
Price	559	143	Hood	144	54
Upper Colorado	311	128	Willamette	113	29
Gunnison	1,059	152	Lewis	182	59
San Juan	538	106	Cowlitz	181	74
Dolores	-	138	PACIFIC COASTAL BASIN		
Virgin	-	271	Puget Sound	200	63
Gila	-	-	Olympic Peninsula	165	50
Salt	-	-	Umpqua - Rogue	438	54
Verde	-	-	Klamath	1,196	57
GREAT BASIN			Trinity	3,980	199
Bear	-	120	CALIFORNIA		
Logan	-	123	CENTRAL VALLEY		
Ogden	-	150	Upper Sacramento	3,540	177
Weber	670	119	Feather	3,280	164
Provo - Utah Lake	318	157	Yuba	3,520	176
Jordan	-	126	American	3,200	160
Sevier	-	161	Mokelumne	3,720	186
Walker - Carson	4,000	175	Stanislaus	4,200	210
Tahoe - Truckee	1,750	143	Tuolumne	4,560	228
Humboldt	485	132	Merced	5,040	257
Lake Co. (Oregon)	-	83	San Joaquin	5,040	252
Harney Basin (Oregon)	-	37	Kings	5,420	271
Owens	5,840	292	Kaweah	4,740	237
UPPER COLUMBIA BASIN			Tule	-	195
Columbia (Canada)	141	82	Kern	6,000	300
Kootenai	208	83	Data for California Watersheds supplied by Dept. of Water Resources, and for British Columbia Watersheds by Dept. of Lands, Forests and Water Resources.		
Clark Fork	315	82			
Bitterroot	312	98	Average is for 1958-72 period. California ave- rages are for the period 1931-70. Based on Selected Snow Courses determined by Distri- bution within the Basin. Length of Record and Repetitive Monthly Measurement Schedules.		
Flathead	239	91			
Spokane	256	63			
Okanogan	430	103			
Methow	257	121			
Chelan	215	106			
Wenatchee	278	70			

and below normal precipitation during April has melted most of the snow except at the very highest elevations of Arizona.

Streamflow is steadily receding from the very high stages in March and no more heavy runoff is expected. Total spring runoff, however, has been excellent on most watersheds. Central Arizona streams have produced three to four times the normal flow amounts.

Except for San Carlos Reservoir all central Arizona reservoirs are nearly full.

CALIFORNIA

The California Department of Water Resources, coordinating agency for snow surveys and water supply forecasting in California, reports that precipitation during April was well above average throughout most of the state and water supplies continued to increase. Cool weather and storm activities during April delayed the start of sustained snowmelt at the higher elevations by about a month. Snow accumulation continued, and water content on May 1 was greater than on April 1. As a result, runoff forecasts for the April through July period have been increased and reservoir operators may have to reassess water regulation plans based on the updated inflow potentials from their watersheds.

Forecasts of unimpaired April-July streamflow show runoff volumes will now range from 114 percent of normal for the Pit River to 295 percent for the Kern. Most Sacramento Valley streams are forecast to produce about 150 percent of normal flows. In the San Joaquin Valley all streams from the Merced River south will have over 200 percent of normal runoff.

Snowpack measurements show that melt has been proceeding at normal rates from elevations below 6,500 feet, but water accumulation exceeded snowmelt above that level during April in most areas and a near record pack still exists, especially in the southern Sierra. Current daily readings from available automatic snow sensors confirm that sustained melt has now started throughout the snow zone.

Runoff during April ranged from near normal in the San Francisco Bay Area to 345 percent of normal in the South Coastal area. In the Central Valley, runoff for the month was about 130 percent of average ranging from about 110 percent of normal on the Feather and Yuba Rivers to 200 percent of normal on the Kern. Water year runoff to date has been one-and-one-half times normal in Central Valley basins.

Reservoir storage ranged from 75 percent of average in the North Coast and Lahontan

areas to 134 percent in the South Coastal area. Storage in the Central Valley increased by 1.8 million acre feet during April, and the total storage is now slightly above average for this date. Statewide storage is over twice that of last year on May 1. Substantial releases are being made from many reservoirs in anticipation of heavy snowmelt inflows during May and June.

COLORADO

Streamflows will vary greatly over the state this summer.

The snowpack in the Steamboat Springs area is the highest on record and heavy runoff can be expected this summer. Flows of the White, Elk, and North Platte Rivers should also be considerably above the 15-year average. Snowfall on the Gunnison and San Juan Basin was slightly improved during April. Summer flows should be considerably above normal in these basins.

The effects of last year's severe drought are still being felt. Some of the spring runoff will be needed to satisfy soil moisture deficits from last year.

The Rio Grande Basin is near normal, but high elevations of the watershed are in better condition than lower elevations. Reservoir storage is poor, and inadequate to offset low streamflows expected later this summer. The Arkansas Drainage has similar conditions. The high elevation headwater areas of the Arkansas has a good snowpack, but the low elevations are almost bare. There is practically no carryover storage. The southern tributaries, Purgatoire and Cucharas, will flow less than normal.

The eastern slope of the Front Range from Colorado Springs north to the Wyoming line had below normal snowfall during March and April. As a result, forecasts for the South Platte and its northern tributaries dropped slightly. Near normal flows are forecast for the entire area. Since carryover storage is less than normal, some shortages may be expected late in the summer season.

Reservoir storage remains well below normal, and late season supplemental water will not be adequate unless above normal rainfall is received this summer.

These forecasts and outlook projections are based on the assumption that near normal weather patterns will prevail during the balance of the spring and summer.

SELECTED STREAMFLOW FORECASTS

MAY 1, 1978

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
SASKATCHEWAN				
St. Mary near Babb, Montana <u>1/</u>	420	90	May-Sept.	468
UPPER MISSOURI				
Beaverhead near Grant, Montana <u>2/</u>	108	102	May-Sept.	40
Big Hole near Melrose, Montana	690	104	May-Sept.	
Madison near Grayling, Montana <u>3/</u>	467	110	May-Sept.	256
Gallatin near Gateway, Montana	570	112	May-Sept.	
Sun at Gibson Dam, Montana <u>4/</u>	505	91	May-Sept.	181
Belt near Monarch, Montana	140	122	May-Sept.	
Marias near Shelby, Montana <u>5/</u>	430	88	May-Sept.	35
Missouri near Landusky, Montana <u>6/</u>	4,550	110	May-Sept.	
near Williston, North Dakota <u>7/</u>	11,400	110	May-Sept.	10,352
S.Fk. Musselshell above Martinsdale, Montana	56	126	May-Sept.	
Milk at Eastern Crossing, Montana	200	90	May-Sept.	221
Yellowstone at Yellowstone Lake Outlet, Wyo.	900	110	April-Sept.	387
at Corwin Springs, Montana	2,100	110	May-Sept.	1,021
at Miles City, Montana <u>8/</u>	6,350	107	May-Sept.	5,931
Clarks Fork near Belfry, Montana	690	118	May-Sept.	-
Shoshone below Buffalo Bill Res., Wyoming <u>9/</u>	960	116	April-Sept.	381
Wind near Dubois, Wyoming	145	142	April-Sept.	
at Riverton, Wyoming <u>10/</u>	780	117	April-Sept.	292
below Boysen Res., Wyoming <u>11/</u>	1,000	99	April-Sept.	479
Bull Lake Creek near Lenore, Wyoming	170	93	April-Sept.	105
Little Popo Agie near Lander, Wyoming	36	75	April-Sept.	20
Tensleep near Tensleep, Wyoming	85	108	April-Sept.	
Medicine Lodge near Hyattville, Wyoming	25	119	April-Sept.	
Shell Creek near Shell, Wyoming	88	121	April-Sept.	55
Big Horn near St. Xavier, Montana <u>8/</u>	1,900	110	May-Sept.	431
Tongue near Dayton, Wyoming	125	111	April-Sept.	107
No. Fork Powder near Hazelton, Wyoming	10	100	April-Sept.	7.7
PLATTE				
North Platte at Northgate, Colorado	830	128	April-Sept.	257
Encampment near Encampment, Wyoming	184	130	April-Sept.	55
Deer Creek at Glenrock, Wyoming	25	96	March-July	30
Laramie Riv. & Pioneer Canal, nr Woods, Wyo. <u>12/</u>	145	114	April-Sept.	67
Big Thompson at Drake, Colorado <u>13/</u>	105	98	April-Sept.	
Clear at Golden, Colorado <u>14/</u>	125	98	April-Sept.	
St. Vrain at Lyons, Colorado <u>15/</u>	75	100	April-Sept.	
Cache La Poudre near Fort Collins, Colorado <u>16/</u>	235	95	April-Sept.	
ARKANSAS				
Arkansas at Salida, Colorado <u>17/</u>	330	105	April-Sept.	
Cucharas near LaVeta, Colorado	8	80	April-Sept.	
Purgatorie at Trinidad, Colorado	32	84	April-Sept.	
RIO GRANDE				
Rio Grande near Del Norte, Colorado <u>18/</u>	380	81	April-Sept.	
at Otowi Bridge, New Mexico <u>19/</u>	500	95	March-July	
Conejos near Mogote, Colorado <u>20/</u>	175	95	April-Sept.	
El Vado Res., Inflow, New Mexico	200	105	March-July	
Pecos at Pecos, New Mexico	40	98	March-July	
UPPER COLORADO				
Colorado, Granby Res. Inflow, Colorado <u>21/</u>	290	127	April-Sept.	
near Dotsero, Colorado <u>22/</u>	1,800	126	April-Sept.	
near Cameo, Colorado <u>23/</u>	2,900	122	April-Sept.	
near Cisco, Utah <u>24/</u>	3,868	136	April-July	535
Lake Powell Inflow, Arizona <u>25/</u>	9,100	132	April-July	1,130
Roaring Fork at Glenwood Springs, Colorado <u>26/</u>	800	112	April-Sept.	
Uncompahgre at Colona, Colorado	175	130	April-Sept.	

Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

SELECTED STREAMFLOW FORECASTS

MAY 1, 1978

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
UPPER COLORADO (continued)				
Gunnison, Blue Mesa Res. Inflow, Colorado <u>27/</u>	930	117	April-Sept.	
near Grand Junction, Colorado <u>28/</u>	1,500	127	April-Sept.	
Dolores at Dolores, Colorado	300	129	April-Sept.	
Green at Warren Bridge, Wyoming	390	119	April-Sept.	165
at Green River, Wyoming <u>29/</u>	1,340	135	April-Sept.	279
Flaming Gorge Res. Inflow, Utah <u>27/</u>	1,342	114	April-July	233
at Green River, Utah <u>30/</u>	3,733	131	April-July	883
Big Sandy near Big Sandy, Wyoming	60	105	April-Sept.	26
Yampa at Steamboat Springs, Colorado	400	146	April-Sept.	
near Maybell, Colorado	1,300	144	April-Sept.	
Little Snake near Dixon, Wyoming	450	150	April-Sept.	55
White near Meeker, Colorado	420	142	April-Sept.	
Strawberry at Duchesne, Utah <u>40/</u>	65	141	May-July	6.7
Duchesne near Tabiona, Utah <u>31/</u>	85	90	May-July	16
at Randlett, Utah <u>40/</u>	220	101	May-July	10.6
Lakefork below Moon Lake, Utah <u>32/</u>	63	93	May-July	
Uinta near Neola, Utah	76	90	May-July	66
Whiterocks near Whiterocks, Utah	50	89	May-July	22
Price, Scofield Res. Inflow, Utah <u>33/</u>	47	162	May-July	4.2
Cottonwood near Orangeville, Utah <u>34/</u>	47	109	May-July	9.8
San Juan, Navajo Res. Inflow, New Mexico <u>27/</u>	650	109	April-July	
near Bluff, Utah <u>35/</u>	1,036	121	May-July	123
Animas at Durango, Colorado	550	130	April-Sept.	
LOWER COLORADO				
Virgin near Virgin, Utah	46	164	May-June	
Little Colorado above Lyman, Arizona	-	-	-	
Gila near Solomon, Arizona	-	-	-	
Frisco at Clifton, Arizona	-	-	-	
Salt at Intake, Arizona	-	-	-	
Tonto above Roosevelt, Arizona	-	-	-	
Verde above Horseshoe Dam, Arizona	-	-	-	
GREAT BASIN				
Bear at Utah-Wyo. State Line	97	92	May-July	35
at Harer, Idaho	250	105	May-Sept.	27
Smith's Fork near Border, Wyoming	150	130	April-Sept.	27
Thomas Fork near Wyo.Ida. State Line	42	131	April-Sept.	3.8
Logan near Logan, Utah <u>36/</u>	116	118	May-July	27
Ogden, Pine View Res. Inflow, Utah <u>27/</u>	95	149	May-June	10
Weber near Oakley, Utah	95	104	May-June	27
Provo near Hailstone, Utah <u>37/</u>	88	98	May-July	24.8
Strawberry Res. Inflow, Utah	57	158	May-July	1.7
Utah Lake Net Inflow, Utah	185	129	May-July	
Big Cottonwood near Salt Lake City, Utah	39	122	May-July	15.2
Beaver near Beaver, Utah	26	148	May-July	4.1
Sevier near Hatch, Utah	55	167	May-July	7.3
near Gunnison, Utah	40	143	May-July	9.9
So. Fork Humboldt near Elko, Nevada	75	132	May-July	
Humboldt at Palisades, Nevada	186	125	May-July	65
Truckee at Farad, California <u>38/</u>	275	138	May-July	51
East Carson near Gardnerville, Nevada	230	153	May-July	43
West Carson at Woodsfords, California	64	156	May-July	12
East Walker near Bridgeport, California <u>39/</u>	125	212	May-August	9
West Walker near Coleville, California	220	171	May-July	35
Donner and Blitzen near Frenchglen, Oregon	44	105	May-Sept.	
Silvies near Burns, Oregon	24	70	May-Sept.	
Chewaucan near Paisley, Oregon	51	85	May-Sept.	9.1
Deep above Adel, Oregon	38	85	May-Sept.	
Bidwell near Ft. Bidwell, California	10.2	113	May-July	
Owens below Long Valley Res., California	135	165	April-July	28

Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

SELECTED STREAMFLOW FORECASTS

MAY 1, 1978

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
UPPER COLUMBIA				
Columbia at Birchbank, British Columbia <u>40/</u> a.	37,200	86	May-Sept.	
at Grand Coulee, Washington <u>40/</u> a.	55,000	89	May-Sept.	
below Rock Island, Washington a.	61,600	90	May-Sept.	
Kootenai below Libby Dam near Libby, Montana	5,600	80	May-Sept.	3,662
at Leonia, Idaho	6,700	81	May-Sept.	4,410
Blackfoot near Bonner, Montana	830	92	May-Sept.	
So.Fk. Flathead nr Columbia Falls, Montana <u>40/</u>	2,060	97	May-Sept.	1,016
Flathead at Columbia Falls, Montana <u>40/</u>	5,400	93	May-Sept.	2,653
near Polson, Montana <u>40/</u>	6,400	94	May-Sept.	2,968
Clark Fork above Missoula, Montana	1,520	96	May-Sept.	456
near Plains, Montana <u>40/</u> a.	10,100	90	May-Sept.	4,351
at Whitehorse Rapids, Idaho a.	10,900	86	May-Sept.	
Bitterroot near Darby, Montana	590	112	May-Sept.	213
Priest near Priest River, Idaho <u>41/</u> a.	627	92	May-July	
Pend Oreille below Box Canyon, Washington a.	12,100	88	May-Sept.	
Kettle near Laurier, Washington	1,700	105	May-Sept.	973
Spokane at Post Falls, Idaho <u>42/</u>	1,750	86	May-Sept.	
Similkameen near Nighthawk, Washington a.	1,380	97	May-Sept.	558
Okanogan near Tonasket, Washington a.	1,510	95	May-Sept.	617
Methow near Pateros, Washington a.	1,030	109	May-Sept.	
Stehekin at Stehekin, Washington	850	102	May-Sept.	422
Chelan at Chelan, Washington <u>43/</u>	1,200	105	May-Sept.	510
Wenatchee at Peshastin, Washington	1,500	95	May-Sept.	673
SNAKE				
Snake above Palisades Res., Wyoming <u>44/</u>	3,120	119	April-Sept.	1,037
near Heise, Idaho <u>45/</u>	4,370	120	May-Sept.	
near Blackfoot, Idaho <u>46/</u>	4,600	121	May-July	
at Weiser, Idaho a.	5,890	116	May-Sept.	
Grey's above Palisade, Wyoming	525	135	April-Sept.	90
Salt above Palisade, Wyoming	520	142	April-Sept.	121
Henry's Fork near Ashton, Idaho <u>47/</u>	650	114	May-Sept.	
Teton near St. Anthony, Idaho	435	109	May-Sept.	
Big Lost near MacKay, Idaho <u>48/</u>	155	92	May-Sept.	
Little Lost near Howe, Idaho	31	87	May-Sept.	
Portneuf at Topaz, Idaho	78	118	May-Sept.	
Oakley Res. Inflow, Idaho	18	98	May-Sept.	
Salmon Falls Creek near San Jacinto, Idaho	58	107	May-Sept.	
Little Wood above High 5 Crks, Idaho	88	120	May-Sept.	
Big Wood, Inflow to Magic Res., Idaho <u>49/</u>	240	115	May-Sept.	
Bruneau near Hot Springs, Idaho	170	104	May-Sept.	
Boise near Boise, Idaho <u>50/</u>	1,500	112	May-Sept.	
Owyhee near Owyhee, Nevada <u>51/</u>	45	110	May-July	
Owyhee Res. Net Inflow, Oregon <u>27/</u>	183	105	May-July	72
Malheur near Drewsey, Oregon	28	85	May-July	
Payette near Horseshoe Bend, Idaho <u>52/</u>	1,735	113	May-Sept.	
Weiser above Crane Creek, Idaho <u>40/</u>	275	100	May-Sept.	
Burnt near Hereford, Oregon <u>40/</u>	15.5	105	May-Sept.	
Powder near Sumpter, Oregon	39	95	May-Sept.	
Eagle above Skull Creek, Oregon	162	97	May-Sept.	
Imnaha at Imnaha, Oregon	266	105	May-Sept.	
Salmon at Whitebird, Idaho a.	6,380	101	May-Sept.	
Lostine near Lostine, Oregon	111	95	May-Sept.	
Grande Ronde at LaGrande, Oregon	58	60	May-Sept.	45
Clearwater at Spalding, Idaho a.	5,330	77	May-Sept.	
LOWER COLUMBIA				
Yakima at CleElum, Washington <u>53/</u>	600	76	May-Sept.	
near Parker, Washington <u>54/</u>	1,100	63	May-Sept.	596
Naches near Naches, Washington <u>55/</u>	650	87	May-Sept.	

Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

SELECTED STREAMFLOW FORECASTS

MAY 1, 1978

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
LOWER COLUMBIA (continued)				
Walla Walla, So. Fork near Milton, Oregon	44	86	May-Sept.	
Umatilla at Pendleton, Oregon	37	55	May-July	
John Day, Middle Fork at Ritter, Oregon	57	80	May-Sept.	
North Fork at Monument, Oregon	283	80	May-Sept.	
Crooked near Post, Oregon	28	85	May-Sept.	
Deschutes at Benham Falls, Oregon 40/	380	81	May-July	
Columbia at The Dalles, Oregon 40/ a.	-	-	May-June	
at The Dalles, Oregon 40/ a.	68,500	89	May-July	
at The Dalles, Oregon 40/ a.	82,500	90	May-Sept.	
McKenzie near Vida, Oregon	616	65	May-Sept.	
Santiam, South, at Waterloo, Oregon	248	65	May-July	
North, at Mehama, Oregon 40/	390	65	May-July	
Clackamas at Estacada, Oregon	326	58	May-July	
Willamette at Salem, Oregon 40/	2,057	65	May-July	
Lewis at Ariel, Washington 56/	650	70	May-Sept.	750
Cowlitz at Castle Rock, Washington 57/ a.	1,600	76	May-Sept.	1,618
NORTH PACIFIC COASTAL				
Dungeness near Sequim, Washington	105	71	May-Sept.	
Umpqua, No., near Toketee Falls, Oregon 40/ a.	118	85	May-Sept.	
Rogue at Raygold, Oregon	428	66	May-Sept.	429
Klamath Lake, Net Inflow, Oregon	300	85	May-Sept.	223
Trinity at Lewiston, California	1,010	164	April-July	113
CALIFORNIA CENTRAL VALLEY 40/				
Sacramento, Inflow to Shasta, California	2,500	141	April-July	798
Feather near Oroville, California	2,950	158	April-July	397
Yuba at Smartville, California	1,580	146	April-July	198
American, Inflow to Folsom Res., California	2,040	155	April-July	233
Cosumnes at Michigan Bar, California	240	182	April-July	13
Mokelumne, Inflow to Pardee Res., California	760	163	April-July	106
Stanislaus, Inflow to Melones Res., California	1,340	187	April-July	120
Tuolumne, Inflow to Don Pedro Res., California	2,300	192	April-July	275
Merced, Inflow to Exchequer Res., California	1,320	217	April-July	128
San Joaquin, Inflow to Millerton Lake, Calif.	2,890	242	April-July	262
Kings, Inflow to Pine Flat Res., California	2,600	225	April-July	274
Kaweah, Inflow to Terminus Res., California	600	222	April-July	62
Tule, Inflow to Success Res., California	135	220	April-July	5
Kern, Inflow to Isabella Res., California	1,240	295	April-July	91
ALASKA				
Yukon at Eagle, Alaska	23,100	65	April-July	
at Ruby, Alaska	59,000	79	April-July	
Porcupine near Fort Yukon, Alaska	5,670	65	April-July	
Salcha near Salchaket, Alaska	480	67	April-July	552
Little Chena near Fairbanks, Alaska	58	62	April-July	83
Chena at Fairbanks, Alaska	335	60	April-July	493
Ship Creek near Anchorage, Alaska	52	88	April-July	94
So.Fk.Campbell at Canyon Mouth nr Anchorage, AK	11.8	91	April-July	20

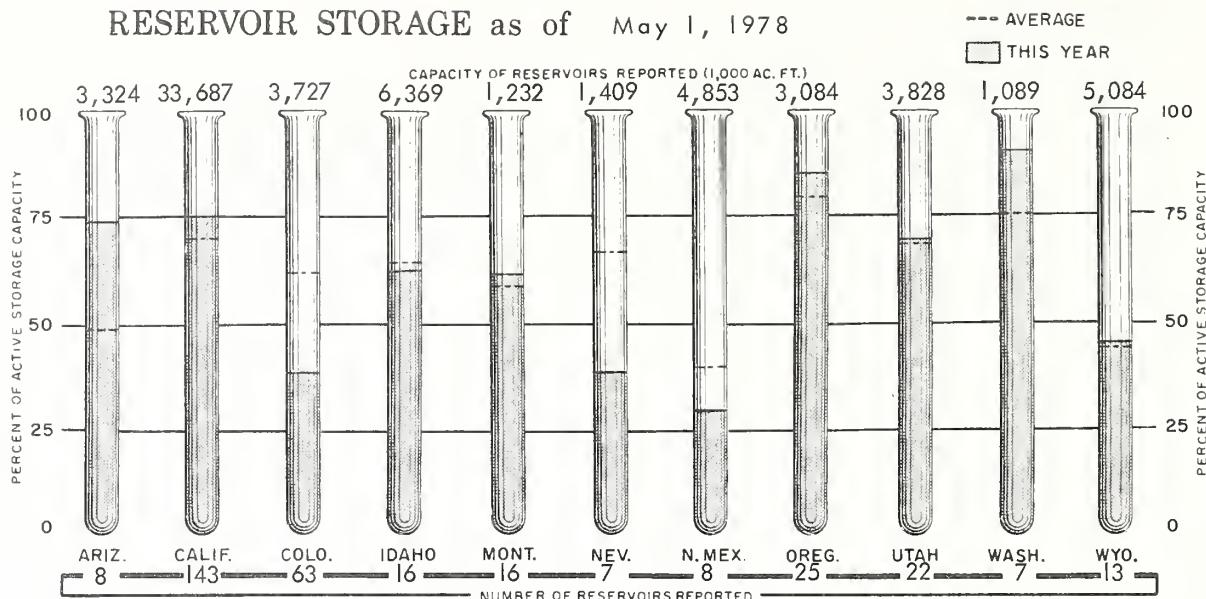
Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

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Explanatory Notes on Forecasts listed on Inside Back Cover.

RESERVOIR STORAGE as of May 1, 1978



IDAHO

Water supplies for Idaho are forecast to be generally adequate for the 1978 irrigation season.

Seasonal streamflow forecasts vary from 77 percent of average for the Clearwater River at Spalding to 157 percent of normal for Montpelier Creek near Montpelier.

Snowfall in the mountainous areas and rain in the valleys were well above normal during April. Snow water equivalent increased on most high elevation snow courses, remained quite static at middle elevations and melted off at the lower elevation sites.

Valley precipitation in Idaho during the past 30 days was above normal. Ketchum received 321 percent of normal, the greatest April total in 40 years of record.

Mountain soil moisture is good at lower elevations, fair to good at middle elevations, and only fair in the high mountainous areas.

In general, streamflow during April was near normal with a resultant increase in reservoir storage. Though storage in general is slightly below average, the major reservoirs are expected to fill by the beginning of the irrigation season. Some reservoirs are presently being lowered to make room for the major snowmelt runoff which will occur in late May and June.

MONTANA

Irrigation water supplies are expected to be adequate in Montana this summer. Most rivers are forecast to yield average or above normal volumes.

The high elevation snowpack is near average in most areas. Lower elevations have below average water content. As a result, early season runoff will be a little less than normal, but the good high elevation snow will hold streamflows up later in the summer.

The warm temperatures that started the snow melting near the end of March have continued. Alternating periods of warm weather and snowfall have allowed snow water content levels in the higher areas to remain about the same as they were at the beginning of April.

West of the continental divide, the Flathead and Bitterroot Rivers have near average snowpack while the remainder of the drainages have below average snow.

East of the divide, above average snow water content was measured in parts of the Red Lodge, Big Hole, Madison, Gallatin and Yellowstone River headwaters and in the Bear Paw, Big Belt, Little Belt and Castle Mountains.

The small area on the front face of the Beartooth Mountains near Red Lodge continues to show well below average snow.

STORAGE IN LARGE RESERVOIRS MAY 1, 1978

BASIN AND NAME OF RESERVOIR	CAPACITY (1,000 A.F.)	STORAGE (1,000 A.F.)	STORAGE PERCENT AVERAGE	BASIN AND NAME OF RESERVOIR	CAPACITY (1,000 A.F.)	STORAGE (1,000 A.F.)	STORAGE PERCENT AVERAGE
UPPER MISSOURI				UPPER COLUMBIA			
Belle Fourche	185	180	136	Chelan	676	242	108
Boysen	550	184	99	Coeur d'Alene	225	202	80
Buffalo Bill	373	145	121	Duncan	1,400	150	152
Canyon Ferry	2,043	1,514	98	Flathead	1,791	835	85
Fort Peck	19,140	16,390	122	Hungry Horse	3,428	1,947	97
Garrison	24,790	17,883	122	Kootenay	787	207	58
Hebgen	377	169	79	Lake Koocanusa	5,694	1,865	-
Keyhole	192	144	175	Lower Arrow	2,691	761	335
Lake Francis Case	5,816	4,207	101	Noxon Rapids	335	234	170
Lake Sharpe	1,900	1,773	103	Pend Oreille	1,155	442	83
Oahe	23,630	21,621	129	Roosevelt	5,232	860	52
Tiber	1,347	565	92	Upper Arrow	4,400	1,026	170
Bighorn Lake	1,356	802	102	LOWER COLUMBIA			
PLATTE				Cougar	155	94	87
So. Platte in Co (30)	1,067	674	81	Detroit	300	172	69
City of Denver (7)	604	297	64	Green Peter	270	158	79
Colo-Big Thompson (4)	728	183	42	Hills Creek	200	147	93
Glendo	784	440	97	Lookout Point	337	143	56
Pathfinder	1,016	530	128	Prineville	153	162	110
Seminole	1,010	245	78	Wickiup	200	197	104
ARKANSAS				Yakima Res. (5)	1,066	964	121
Conchas	273	98	56	SNAKE			
John Martin	621	0	0	American Falls	1,125	1,584	145
Turquoise	121	43	-	Anderson Ranch	423	233	85
Pueblo	354	4	-	Arrow Rock	287	180	78
RIO GRANDE				Brownlee	980	644	174
Elephant Butte	2,195	198	52	Cascade	653	423	120
New Mexico Res. (4)	571	578	112	Dworshak	2,016	993	298
UPPER COLORADO				Jackson	847	330	66
Blue Mesa	830	276	90	Lucky Peak	278	139	97
Flaming Gorge	3,749	2,065	127	Owyhee	715	715	127
Navajo	1,696	1,030	84	Palisades	1,200	316	41
Powell	25,002	14,996	179	Warm Springs	191	151	108
Starvation	152	127	-	PACIFIC COASTAL			
LOWER COLORADO				Clair Engle	2,448	1,502	72
Havasu	619	584	99	Clear Lake	440	230	86
Mead	26,159	21,003	124	Nacimiento	350	342	175
Mohave	1,810	1,599	94	Ross	1,053	793	106
Salt River Res. (4)	1,755	1,687	143	Upper Klamath	584	489	94
San Carlos	949	263	134	CALIFORNIA			
Verde River Res. (2)	318	309	187	CENTRAL VALLEY			
GREAT BASIN				Almanor	1,308	833	102
Bear	1,421	848	82	Berryessa	1,602	1,339	90
Lahontan	291	212	97	Bullards Bar	961	746	122
Rye Patch	172	68	64	Folsom	1,010	844	123
Sevier Bridge	236	104	91	Isabella	570	284	156
Strawberry	274	164	127	McClure	1,026	563	90
Tahoe	732	145	30	Millerton	521	241	71
Utah	884	793	119	Oroville	3,538	3,168	112
Willard Bay	193	184	114	Pine Flat	1,002	488	80
				Shasta	4,552	4,432	114

Reservoir Storage Data Provided by Bureau of Reclamation, Corps of Engineers, Geological Survey, and water using organizations. Data from California and British Columbia provided by Department of Water Resources and Department of Lands, Forests and Water Resources, respectively.

Other areas in the Yellowstone and Missouri River drainages have near average snowpack in the main water producing zones.

May through September runoff is forecast to be below average in extreme northwestern Montana and in smaller areas near Drummond, Shelby and Red Lodge.

Above average runoff is expected in the Bitterroot River drainage, and most streams and rivers south and west of the Missouri River and the Madison and Gallatin River drainages in the Missouri River headwaters.

Runoff in April was generally a little above average in most drainages. The gradual melting of low elevation snow has helped reduce the potential for extremely high water resulting from rapid snowmelt.

Reservoir storage statewide is near the average for May 1. Missouri system impoundments are generally fuller than normal, while some Columbia River reservoirs are below average.

NEVADA

Prospects for adequate water supplies in Nevada continue to be good. Snow surveys taken about May 1 indicate above average snowpacks in all areas affecting the state. Cool temperatures and stormy conditions during April slowed snowmelt and allowed the high elevation snowpack to continue accumulating. Several storms passed through the state depositing above average snowfall in the mountainous areas.

Snowpacks are now 138 percent on the Tahoe Basin, 148 percent on the Truckee, 160 percent on the Carson, and 189 percent on the Walker. Other areas within the state include the Upper Humboldt with 132 percent, the Owyhee with 117 percent, the Snake with 135 percent and Eastern Nevada and the Northern Great Basin with 150 percent of average. Most of the snow is on the high elevation snow courses.

Streamflow forecasts for the May through July period for the Sierra streams include: the Truckee River at Farad, California, 138 percent of average; the East Carson near Gardnerville, 153 percent; and the West Walker near Coleville, California, 171 percent of normal. Lake Tahoe is forecast to rise 1.55 feet from May to the high elevation (assuming the outlet gates are closed) compared to a 1.09 feet average.

Most streams are forecast to yield from 125 to 160 percent of normal, while the Owyhee River near Gold Creek is forecast at 137 percent of average.

Reservoir storage has improved slightly

during the month; however, most reservoirs are below average. For example, the combined usable storage of Tahoe, Boca and Lahontan reservoirs is only 54 percent of normal.

NEW MEXICO

Limited snow surveys made May 1 indicate that the pack has melted from all but the highest reaches of the state's watersheds.

Forecasts of streamflow on major streams have been revised downward slightly. The Rio Grande and Rio Chama are expected to flow from 95 to 105 percent of normal. Most other tributaries to the Rio Grande should flow 10 to 20 percent above average. Although most streams are forecast to flow near to above average, reservoir storage remains low in most areas. This means additional precipitation will be important in the production of good crops this summer. Elephant Butte and Conchas only hold about one-half their normal May 1 contents, while Sumner has only 5 percent of its normal.

Subsurface moisture is fair in irrigated areas. However, a storm near the first of May added enough in some local areas to substantially improve soil moisture at this time.

OREGON

The water supply outlook for Oregon is good for most water users. However, late season shortages may occur for users who divert directly from streams except in the extreme eastern fourth of the state. Reservoir storage is excellent and rains during April were above normal in all areas.

A poor snow cover generally exists in the state. The snowpack is 25 to 65 percent of average in the Cascades, 85 percent of average in the Siskiyou and 35 to 55 percent in most areas of eastern Oregon. The Wallowa Mountains and the Owyhee drainage are the only areas with normal snow cover for this time of year.

April precipitation ranged from a low of 110 percent to 115 percent in the Hood and Rogue River basins to a high of three and one half times normal in Malheur county. Mountain watershed soil moisture is average to above for May 1.

Most rivers in the state are forecast to yield from 60 to 85 percent of their normal snowmelt runoff. A major exception is the Owyhee which is expected to discharge 105 percent of its average flow into Owyhee reservoir. Elsewhere, the Malheur and Upper Klamath Lake inflow are both forecast at

85 percent of normal, the Deschutes 81 percent, and the Silvies, Willamette, and Grande Ronde at 70, 68, and 60 percent of normal respectively.

Storage is normal or above in all of the principal irrigation reservoirs. Twenty-five of these impoundments are storing 2,628,000 acre feet, or 107 percent of the May 1 average.

UTAH

Utah's 1978 water supply outlook ranges from a little below average for reservoir water users on the Sevier and Uintah basins to an average or better than average supply for the remainder of the state.

Snow water content held up very well during April at central and southern Utah snow courses. Basin snowpacks vary from 114 percent of average on Parowan Creek to 271 percent on the Virgin River. Coal Creek is 216 percent of average, the Upper Sevier and Beaver Rivers are 174 percent, and the Lower Sevier 147 percent of the May 1 average. Fremont River is 128 percent of average, the Blue Mountains above Monticello and Blanding 127 percent, and the LaSals 203 percent.

The Strawberry River snowpack is 206 percent of average, Utah Lake tributaries as a whole are 157 percent, with American Fork about twice average and the Upper Provo near average. Uintah Mountains snowpacks range from 91 percent on the north slope to 126 percent on the Uintah-Whiterocks drainage. Lakefork and Ashley Creeks snowpacks are 95 percent and 97 percent of normal respectively.

Salt Lake front watersheds are 126 percent of average, Weber River 119 percent, Tooele Valley and Logan River 123 percent, the Upper Bear 118 percent, and Lower Bear 122 percent. The Ogden River is still 150 percent of the May 1 average primarily due to a heavy accumulation on the North Fork.

Soil moisture is still generally below average under the snowpack. Soils below the snow line are now near average.

Streamflow forecasts continued to improve in southern Utah. Delayed snowmelt increased the forecasts for the May-July period as much as 58 percent on the Sevier River at Circleville, which is now forecast 281 percent of average. The Sevier River is forecast to yield 143 percent of normal at Gunnison. Other representative streams forecasts include the Beaver River at 148 percent, the Provo River 98 percent of average, and total Utah Lake Inflow 129 percent of the May-July average.

Strawberry Inflow is forecast to be 158 percent of average, Lakefork 93 percent, while the Duchesne and Uintah are expected

to yield 90 percent of normal.

Storage in 24 of Utah's key irrigation reservoirs now totals 100 percent of the May 1 average. Good April flows have increased storage to 96 percent of last year's level and 69 percent of useable capacity.

Most reservoirs are expected to fill except Sevier Bridge, Steinaker, Moon Lake, Strawberry, Bear Lake, Piute, Otter Creek and Minersville.

All water users are expected to have near average to above average water supplies with the possible exception of those depending on reservoir storage alone for those reservoirs that may not have a full supply this season.

WASHINGTON

The water supply outlook in Washington varies from near average in the north central part of the state to below normal elsewhere. Some improvement in conditions was noted in the north during April where above normal snowfall was received. Good rains were received in the southern Cascades also, but the snowpack is nearly gone and flows will not be sustained throughout the summer.

Snowpack conditions are variable, with only about 50 percent of normal remaining on the Olympic Peninsula and Puget Sound drainages. The Cowlitz and Lewis Rivers' snowpack is also below average as is the pack in both southeast and northeast parts of the state. The snowpack conditions improve along the east slopes of the Cascades from south to north. While the Yakima snowpack is below average, the Okanogan and Chelan drainages have normal to slightly above average snowpacks.

Streams are forecast to yield below normal amounts over a wide area of the state. The mainstem of the Columbia will contribute about 90 percent of its normal. The Yakima is only expected to yield 63 percent of average at Parker. Streams from the Wenatchee to the Kettle will yield near average quantities, but below normal flows are expected from streams flowing west from the Cascades.

The major irrigation reservoirs are generally in excellent shape. The five reservoirs in the Yakima Basin are 121 percent of normal. The power reservoirs generally have excellent amounts of water in storage or have good potential for filling during the spring runoff.

WYOMING

Although the mountain snowpack has

declined from last month due to below normal precipitation, the water supply outlook remains at or above normal for the spring and summer months throughout most of the state.

End of the month storms provided only minor offsets for the unseasonably early snowmelt. The snowpack on the Snake and Bear River drainages stands at 112 percent of normal, while the Green and North Platte watersheds have 116 and 117 percent of average respectively. The Bighorn, Powder and Tongue River drainages are below the May 1 normal, at 83 percent.

Streamflow forecasts generally range from 10 percent below to 20 percent above normal for the spring and summer months. The exceptions are the Little Popo Agie and Deer Creek at three-fourths of normal and some areas in the southeast and west side that are much above average.

Reservoir storage in the Snake Basin is at only half of the May 1 average. Reservoir storage in the Belle Fourche system is 40 percent above normal. Storage in the remaining portion of the state is near normal.



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